

Application No. 09/739,979
Amendment dated: Dec. 7, 2004
Reply to Office Action of: June 7, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A method of determining interference between channels in a Digital Subscriber Line (DSL) transmission system employing Discrete Multitone (DMT) modulation comprising:

determining a power mask level per channel $P(k)$;

obtaining a channel impulse $h(n)$ after implementation of a time equalization (TEQ) algorithm;

zeroing M main coefficient values of the channel impulse response to produce a residual impulse response $(h'(n))$:

obtaining from the residual impulse response $(h'(n))$ a corresponding residual impulse spectrum $(H'(k))$:

and multiplying the per channel power mask level and $H'(k)$ to obtain a cross channel interference $I(k)$ level.

2. (Currently amended) The method according to claim 1 wherein a Fast Fourier Transform (FFT) is employed to obtain said residual impulse spectrum $(H'(k))$.

3. (Currently amended) A method of estimating cross channel interference $I(k)$ in a Discrete Multitone (DMT) communication system implemented in a Digital Subscriber Line (DSL) application, said DMT communication system employing inter-symbol cyclic prefix (M) and Time Equalization (TEQ), the method comprising:

a) measuring a total channel impulse response $h(n)$ after TEQ;

b) zeroing M main coefficients from $h(n)$;

c) performing Fast Fourier Transform (FFT) analysis on the result of step b); and

d) obtaining $I(k)$ by multiplying the result of step c) with a maximum power per channel value.

4. (Original) A method of allocating bits per channel in a DMT communication system implemented in a DSL application, said system employing inter-symbol cyclic prefix and Time Equalization, said method comprising;

performing a first bit allocation algorithm to obtain a first bit per channel value and a first power per

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channel level;

obtaining a cross channel interference value based on a measured impulse response;
obtaining a noise value by adding the cross channel interference value to an interference noise value;
obtaining a second power mask per channel based on a pre-calculated power per channel level; and
implementing a second bit allocation algorithm utilizing said noise value, a signal to noise ratio and
said second power mask per channel level to obtain a final bit per channel allocation.

5. (Currently amended) The method according to claim [[5]] 4, wherein a second power mask
per channel level is derived by said second bit allocation algorithm.

6. (Currently amended) A system for determining interference between channels in a Digital
Subscriber Line (DSL) transmission system employing Discrete Multitone (DMT) modulation,
having means for determining interference between channels, comprising:
means to determine a power mask level per channel $P(k)$;
means to obtain a channel impulse value $h(n)$ after implementation of a time equalization (TEQ)
algorithm;
means for zeroing M main coefficient values of the channel impulse response to produce a residual
impulse response ($h'(n)$);
means for obtaining from the residual impulse response ($h'(n)$) a corresponding residual impulse
spectrum ($H'(k)$); and
a multiplier to multiply the per channel power mask level and a residual impulse spectrum ($H'(k)$)
to obtain a cross channel interference ($I(k)$) level.

7. (Currently amended) A system for estimating cross channel interference $I(k)$ in a Discrete
Multitone (DMT) communication system implemented in a Digital Subscriber Line (DSL)
application, said DMT system employing inter-symbol cyclic prefix (M) and Time Equalization
(TEQ), and having the system cross-channel interference ($I(k)$) estimating means comprising:
a) measurement means to measure a total channel impulse response $h(n)$ after TEQ;
b) means to zero M main coefficients from $h(n)$;
c) means to perform Fast Fourier Transform (FFT) analysis on the result of step b); and
d) means to obtain $I(k)$ by multiplying the result of step c) with a maximum power per channel value.

8. (Currently amended) A system for allocating bits per channel in a DMT communication
scheme system implemented in a DSL application employing inter-symbol cyclic prefix and Time
Equalization, said system having means for allocating bits per channel comprising:
means for performing a first bit allocation algorithm to obtain a first bit per channel value and a first

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power per channel level;

means for obtaining a cross channel interference value based on a measured impulse response;
means for obtaining a noise value by adding the cross channel interference value to an interference noise value;

means for obtaining a second power mask per channel based on a pre-calculated power per channel level; and

means for implementing a second bit allocation algorithm utilizing said noise value, a signal to noise ratio and said second power mask per channel level to obtain a final bit per channel allocation.

9. (New) A receiver for use in a Digital Subscriber Line (DSL) transmission system employing Discrete Multitone (DMT) modulation, the receiver having interference determining means comprising:

means to determine a power mask level per channel $P(k)$;

means to obtain a channel impulse value $h(n)$ after implementation of a time equalization (TEQ) algorithm;

means for zeroing M main coefficient values of the channel impulse response to produce a residual impulse response ($h'(n)$);

means for obtaining from the residual impulse response ($h'(n)$) a corresponding residual impulse spectrum ($H'(k)$); and

a multiplier to multiply the per channel power mask level and a residual impulse spectrum ($H'(k)$) to obtain a cross channel interference ($I(k)$) level.

10. (New) A receiver for use in a Discrete Multitone (DMT) communication system implemented in a Digital Subscriber Line (DSL) application, said DMT system employing inter-symbol cyclic prefix (M) and Time Equalization (TEQ), the receiver having cross-channel interference ($I(k)$) estimating means comprising:

a) measurement means to measure a total channel impulse response $h(n)$ after TEQ;

b) means to zero M main coefficients from $h(n)$;

c) means to perform Fast Fourier Transform (FFT) analysis on the result of step b); and

d) means to obtain cross-channel interference ($I(k)$) by multiplying the result of step c) with a maximum power per channel value.

11. (New) A receiver for use in a DMT communication scheme implemented in a DSL application employing inter-symbol cyclic prefix and Time Equalization, said receiver having means for allocating bits per channel comprising;

means for performing a first bit allocation algorithm to obtain a first bit per channel value and a first

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power per channel level;
means for obtaining a cross channel interference value based on a measured impulse response;
means for obtaining a noise value by adding the cross channel interference value to an interference noise value;
means for obtaining a second power mask per channel based on a pre-calculated power per channel level; and
means for implementing a second bit allocation algorithm utilizing said noise value, a signal to noise ratio and said second power mask per channel level to obtain a final bit per channel allocation.